SECTION 23 81 00
DECENTRALIZED UNITARY HVAC EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies through-the-wall packaged terminal air conditioners

B. Definitions:

1. Energy Efficiency Ratio (EER): The ratio of net cooling capacity is Btu/h to total rate of electricity input in watts under designated operating conditions (Btu hour/Watt).
2. Seasonal Energy Efficiency Ratio (EER): The ratio of the total cooling output of an air conditioner during its normal annual usage period for cooling in Btu/h divided by total electric energy input in watts during the same period (Btu hour/Watt).
3. Unitary: A Unitary Air Conditioner consists of one or more factory-made assemblies which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function as well.
4. Where such equipment is provided in more than one assembly the separated assemblies are to be designed to be used together and the requirements of rating are based upon use of matched assemblies.

1.2 RELATED WORK

A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment: Seismic requirements for non-structural equipment.

B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.

C. Section 23 07 11, HVAC and BOILER PLANT INSULATION: Requirements for piping insulation.

D. Section 23 23 00, REFRIGERANT PIPING: Requirements for refrigerant pipes and fittings.

E. Section 23 05 93, TESTING, ADJUSTING, and BALANCING FOR HVAC: Requirements for testing and adjusting air balance.

1.3 QUALITY ASSURANCE

A. Refer to specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

B. Safety Standards: ASHRAE Standard 15, Safety Code for Mechanical Refrigeration.

1.4 SUBMITTALS

A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES

B. Manufacturer's literature and data:

1. Sufficient information, including capacities, pressure drops and piping connections clearly presented, shall be included to determine compliance with drawings and specifications for units noted below:
   a. Through-the-wall packaged terminal air conditioning units
2. Unit Dimensions required clearances, operating weights accessories and start-up instructions.
3. Electrical requirements, wiring diagrams, interlocking and control wiring showing factory installed and portions to be field installed.

C. Certification: Submit proof of specified ARI Certification.

D. Performance Rating: Submit catalog selection data showing equipment ratings and compliance with required sensible-to-heat-ratio, energy efficiency ratio (EER), and coefficient of performance (COP).

E. Operating and Maintenance Manual: Submit three copies of Operating and Maintenance manual to Resident Engineer three weeks prior to final inspection.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Federal Specifications (Fed. Spec.):

A-A-50502-90 ..... Air conditioner (Unitary Heat Pump) Air to Air (3000-300,000 Btu)

C. Military Specifications (Mil. Specs.):

MIL-PRF-26915D-06 .....Primer Coating, for Steel Surfaces

D. Air-Conditioning, Heating, and Refrigeration Institute (AHRI):

210/240-08 .....Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment

270-08 .....Sound Rating of Outdoor Unitary Equipment

310/380-04 .....Standard for Packaged Terminal Air-Conditioners and Heat Pumps (CSA-C744-04)

340/360-07 .....Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment

520-04 .....Performance Rating of Positive Displacement Condensing Units

E. Air Movement and Control Association (AMCA):

210-07 .....Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI)

410-96 .....Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans

F. American National Standards Institute (ANSI):

S12.51-02(R2007).....Acoustics - Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Method for Reverberation Rooms (same as ISO 3741:1999)

G. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):

2008 Handbook.....HVAC Systems and Equipment

15-10 .....Safety Standard for Refrigeration Systems (ANSI)

H. American Society of Testing and Materials (ASTM):

B117-09.....Standard Practice for Operating Salt Spray (Fog) Apparatus

I. American Society of Civil Engineers (ASCE)
ASCE 7-10 .....Minimum Design Loads for Buildings and Other Structures

J. National Electrical Manufacturer's Association (NEMA):
MG 1-09 (R2010).....Motors and Generators (ANSI)
ICS 1-00 (R2005, R2008)..Industrial Controls and Systems: General Requirements

K. National Fire Protection Association (NFPA) Publications:
90A-09.....Standard for the Installation of Air-Conditioning and Ventilating Systems

PART 2 - PRODUCTS

2.1 PACKAGED TERMINAL AIR CONDITIONERS

A. Description: Factory-assembled and tested, self-contained, air-cooled packaged terminal air conditioner with room cabinet, electric refrigeration system and temperature controls; fully charged with refrigerant and filled with oil; with ted hardwired chassis. The unit shall comply with ASHRAE 15 and should comply with the safety requirements of UL 484.

B. Chassis/Cabinet 1.3-mm- (18 gauge) minimum steel phosphatized, and finished with two coats of baked enamel. Front panel shall be removable with the use of tools to provide full access to filters and cooling unit. Unit shall be tested according to ASTME 331 which assures no water infiltration when tested with eight of rain per hour at 63 mph wind for 15 minutes.

C. Mounting: Wall with wall sleeve

D. Cabinet Extension: Matching cabinet in construction and finish, allowing diversion of airflow to adjoining room; with grille.

E. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

F. Subbase: Enameled steel with adjustable leveling feet and adjustable end plates with factory-installed and -wired, fused disconnect switch and receptacle sized for unit.

G. Wall Sleeves: Galvanized steel with polyester finish not less than 1.3 mm (18 gauge) zinc-coated steel, phosphatized, with manufacturer's standard finish and completely insulated. Design of sleeve for field installation and fasten to outside air louver.
H. Refrigeration System: Direct expansion indoor coil with capillary restrictor; and hermetically sealed scroll compressor with vibration isolation and overload protection.
I. Indoor and Outdoor Coils: Seamless copper tubes mechanically expanded into aluminum fins with capillary tube distributor on indoor coil.
J. For Heat Pump Unit:
    1. Accumulator.
    2. Constant-pressure expansion valve.
    3. Reversing valve.
K. Charge: R410A unless otherwise indicated.
L. Condenser/Evaporator Fans: One direct drive with permanent split capacitor two-speed motor. The condenser fan shall be propeller type and the evaporator fan shall be centrifugal blower type.
M. Filters: Washable polyurethane in molded plastic frame.
N. Condensate Drain: Drain pan to direct condensate to outdoor coil for re-evaporation. Drain pan shall comply with ASHREA 62.1-2004 for construction and connections.
O. Electric-Resistance Heating Coil: Nickel-chromium-wire, electric-resistance heating elements with contactor and high-temperature-limit switch.
P. Hot-Water Heating Coil: Seamless copper tubes mechanically expanded into aluminum fins with two-way modulating control valve and air vent.
Q. Control Module: Unit-mounted digital panel with touchpad temperature control and with touchpad for heating, cooling, and fan operation. Include the following features:
    1. Low Ambient Lockout Control: Prevent cooling-cycle operation below 5 deg C (40 deg F) outdoor air temperature.

2. Heat-Pump Ambient Control: Field-adjustable switch changes to heat-pump heating operation above 5 deg C (40 deg F) and to supplemental heating below minus 4 deg C (plus 25 deg F).
3. Temperature-Limit Control: Prevent occupant from exceeding preset setback or setup temperature.
4. Reverse-Cycle Defrost: Solid-state sensor monitors frost buildup on outdoor coil and reverses unit to melt frost.
6. Remote Control: Standard unit-mounted controls with remote-mounted, low-voltage adjustable thermostat with heat anticipator, heat-off-cool switch, and on-auto fan switch.

R. Outdoor Air: Manual intake damper. Open intake when unit indoor air fan runs.
S. Sound-Power Level Ratings: Factory test to comply with ARI 300, "Sound Rating and Sound Transmission Loss of Packaged Terminal Equipment."
T. Unit Performance Ratings: Factory test according to ARI 310/380/CSA C744, "Packaged Terminal Air-Conditioners and Heat Pumps."

PART 3 EXECUTION

3.1 INSTALLATION

A. Install units level and plumb maintaining manufacturer’s recommended clearances and tolerances.
B. Install water-cooled units with thermometer and pressure gage at the water supply and return connection.
C. Install vibration spring isolators under base of self contained unit, with minimum static deflection of 25 mm (1 inch) unless otherwise indicated.
D. Install ground-mounting, compressor-condenser components on 100 mm (4-inch) thick, reinforced concrete base; 100 mm (4 inches) larger on each side than unit. Concrete, reinforcement, and formwork are specified in Section 03 30 00, CAST-IN-PLACE CONCRETE. Coordinate anchor installation with concrete base.
E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

F. Install wall sleeves in finished wall assembly and weatherproof. Install and anchor wall sleeves to withstand, without damage seismic forces as required by code.

3.2 CONNECTIONS

A. Verify condensate drainage requirements.
B. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
C. Install piping adjacent to units to allow service and maintenance.
D. Connect refrigerant piping to coils with shutoff valves on the suction and liquid lines at the coil and a union or flange at each connection at the coil and condenser.
E. Install ducts to the units with flexible duct connections.
F. Connect piping with shutoff duty valves on the supply and return side of the coil and unions at all connections and with a throttling valve on the return piping near the coil.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
B. Tests and Inspections: After installing units and after electrical circuitry has been energized, test units for compliance with requirements. Inspect for and remove shipping bolts, blocks, and tie-down straps. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Remove and replace malfunctioning units and retest as specified above.

3.4 INSTRUCTIONS

Provide services of manufacturer’s technical representative for four hours to instruct VA personnel in operation and maintenance of units.

3.5 STARTUP AND TESTING

The COR will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the COR. Provide a minimum of 7 days prior notice.

3.6 DEMONSTRATION AND TRAINING

A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.

B. Submit training plans and instructor qualifications.

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